

- (a) inputting a stoichiometric vapor and gas component enriched, ion-generating gas/vapor mixture (EGVM) into an inlet of a first electrode side of a galvanosorptive reaction cell (GRC);
- (b) withdrawing a stoichiometric vapor and gas component depleted ion-generating gas/vapor mixture (DGVM) from an outlet of said first electrode side of said GRC;
- (c) withdrawing a regenerated stoichiometric vapor and gas component enriched gas/vapor/liquid mixture (RGVLM) from an outlet of a second electrode side of said GRC;
- (d) directing said RGVLM into a phase separator for separating said RGVLM into a vapor component enriched liquid phase (ELP) and a vapor component enriched gas phase (EGP);
- (e) withdrawing said EGP from said phase separator and combining said EGP with said DGVM of step (b) upstream of a vapor component enriching vaporizer (VCEV) to form a stoichiometric enriched gas, depleted vapor gas/vapor mixture (EGDVGVM);
- (f) inputting said EGDVGVM into said VCEV in a first flow direction;
- (g) withdrawing said ELP from said phase separator and inputting said ELP into said VCEV in a direction counter to said first flow direction;
- (h) under conditions suitable for enriching said EGDVGVM with a stoichiometric vapor component, heating said ELP to form said EGVM and a vapor component

depleted absorptive liquid (DAL), said EGVM comprising said vapor component and said gas component;

- (i) withdrawing said EGVM from said VCEV and circulating said EGVM into said inlet of said first electrode side of said GRC;
- (j) withdrawing said DAL from said VCEV and circulating said DAL into said inlet of said second electrode side of said GRC; and
- (k) generating electricity via a flow of electrons between said first and second electrode sides of said GRC resulting from a stoichiometric galvanosorptive gas/vapor/liquid reaction with regeneration of said RGVL M at said second electrode side by absorbing said vapor and said gas components from said EGVM.

31. (new) The process of claim 30 wherein, in said step (k), said galvanosorptive gas/vapor/liquid reaction is carried out in a counterflow exchange reaction between said DAL and said EGVM, wherein said counterflow exchange reaction comprises flowing said DAL in a direction counter to a flow direction of said EGVM in said GRC, and wherein said vapor and said gas components from said EGVM are absorbed into said DAL to form said RGVL M.
32. (new) The process of claim 30 further comprising the step of cooling said DAL after withdrawing said DAL from said VCEV in said step (j) and prior to circulating said DAL in said step (j).
33. (new) The process of claim 30 further comprising the step of preheating said ELP prior to inputting said ELP into said VCEV in said step (g).

34. (new) The process of claim 32 further comprising the step of exchanging heat between said ELP and said DAL.
35. (new) The process of claim 33 further comprising the step of exchanging heat between said ELP and said DAL.
36. (new) The process of claim 34 wherein said step of exchanging heat is carried out in a counterflow heat exchanger.
37. (new) The process of claim 35 wherein said step of exchanging heat is carried out in a counterflow heat exchanger.
38. (new) The process of claim 30, wherein said step (k) further comprises the steps of:
- (k1) generating anions or cations from said EGVM at said first electrode side of said GRC;
  - (k2) selectively migrating either said generated anions or said generated cations of step (k1) from said first electrode side of said GRC across an anion selective or a cation selective permeable medium to said second electrode side of said GRC;
  - (k3) releasing electrons from said selectively migrated anions or combining electrons with said selectively migrated cations to form said RGVL at said second electrode side; and
  - (k4) flowing said electrons via a load resistor between said first and second electrode sides to generate said electricity.

**Serial No. 08/875,916**

39. (new) The process of claim 38, wherein said step (k3) comprises combining a stoichiometric amount of said electrons with said selectively migrated cations sufficient to form said regenerated RGVLM at said second electrode side.
40. (new) The process of claim 38, wherein said first electrode side comprises a first electrode which is an anode and said second electrode side comprises a second electrode which is a cathode or vice versa.
41. (new) The process of claim 30, wherein said EGVM comprises hydrogen as said gas component.
42. (new) The process of claim 30, wherein said EGVM comprises ammonia as said vapor component.
43. (new) The process of claim 30, wherein said EGVM comprises oxygen as said gas component.
44. (new) The process of claim 30, wherein said EGVM comprises water as said vapor component.
45. (new) The process of claim 30, wherein said DAL is an aqueous solution selected from the group consisting of H<sub>2</sub>SO<sub>4</sub> (aq), HCl (aq), HNO<sub>3</sub> (aq), H<sub>3</sub>PO<sub>4</sub> (aq), KOH (aq), NaOH (aq), LiNO<sub>3</sub> (aq), LiBr (aq), or NH<sub>3</sub> (aq).
46. (new) The process of claim 38, wherein said medium is an anion selective permeable membrane.
47. (new) The process of claim 38 , wherein said medium is a cation selective permeable membrane.

48. (new) The process of claim 38, wherein said medium is said DAL.
49. (new) The process of claim 30, wherein said DAL comprises an electrolyte component.
50. (new) The process of claim 49, wherein said electrolyte component is a salt comprising a cation selected from the group consisting of group IA, IIA, IIIB, IVB, VB, VIB, VIIIB, VII, IB, IIB and IIIA elements and an anion selected from the group consisting of group VIA elements, group VIIA elements, nitrate, nitrite, phosphate, carbonate, bicarbonate, sulfate, sulfite, hydroxide, oxyhalides and mixtures thereof.
51. (new) The process of claim 30, wherein said first electrode side comprises a first electrode coated and a catalyst.
52. (new) The process of claim 51, wherein said catalyst migrates between said inlet and said outlet of said first electrode.
53. (new) The process of claim 30, wherein one or more of said steps selected from the group consisting of (b), (e), (f), and (i) is conducted using a blower or a compressor.
54. (new) The process of claim 30, wherein at least one of said steps (g) or (j) is conducted using a pump.
55. (new) The process of claim 38, further comprising electrically connecting an activation voltage source in parallel with said first electrode side and said second electrode side.

56. (new) A galvanosorptive reaction process for generating electricity, said process comprising the steps of:
- (a) inputting a vapor and gas component enriched, ion-generating gas/vapor mixture (EGVM) into an inlet of a first electrode side of a galvanosorptive reaction cell (GRC);
  - (b) withdrawing a vapor and gas component depleted ion-generating gas/vapor mixture (DGVM) from an outlet of said first electrode side of said GRC;
  - (c) withdrawing a regenerated vapor and gas component enriched gas/vapor/liquid mixture (RGVLM) from an outlet of a second electrode side of said GRC;
  - (d) directing said RGVLM into a phase separator for separating said RGVLM into a vapor component enriched liquid phase (ELP) and a vapor component enriched gas phase (EGP);
  - (e) withdrawing said EGP from said phase separator and combining said EGP with said DGVM of step (b) upstream of a vapor component enriching vaporizer (VCEV) to form an enriched gas, depleted vapor gas/vapor mixture (EGDVGVM);
  - (f) inputting said EGDVGVM into said VCEV in a first flow direction;
  - (g) withdrawing said ELP from said phase separator and inputting said ELP into said VCEV in a direction counter to said first flow direction;
  - (h) under conditions suitable for enriching said EGDVGVM with a vapor component, heating said ELP to form said EGVM and a vapor component

depleted absorptive liquid (DAL), said EGVM comprising said vapor component and said gas component;

- (i) withdrawing said EGVM from said VCEV and circulating said EGVM into said inlet of said first electrode side of said GRC;
- (j) withdrawing said DAL from said VCEV and circulating said DAL into said inlet of said second electrode side of said GRC; and
- (k) generating electricity via a flow of electrons between said first and second electrode sides of said GRC resulting from a galvanosorptive gas/vapor/liquid reaction with regeneration of said RGVL at said second electrode side by absorbing said vapor and said gas components from said EGVM.

57. (new) A galvanosorptive reaction cell (GRC) for generating electricity, the (GRC) comprising:

- (a) a first electrode comprising a first side and a second side, said first side in contact with an ion-permeable membrane selectively permeable to anions or cations, and said second side in contact with a vapor and gas enriched ion-generating, gas/vapor mixture (EGVM);
- (b) a second electrode comprising a third side and a fourth side, said third side in contact with said ion-permeable membrane, and said fourth side in contact with a vapor component depleted absorptive liquid (DAL);
- (c) an electrical connection between said first electrode and said second electrode;

- (d) a phase separator for separating a regenerated vapor and gas component enriched gas/vapor/liquid mixture (RGVLM) withdrawn from an outlet of said second electrode, into a vapor component enriched liquid phase (ELP) and a vapor component enriched gas phase (EGP);
- (e) a vapor component vaporizer (VCEV) for transferring vapor from said ELP into said EGDVGVM; and
- (f) sufficient conduits connecting said parts (a)-(e) described above.

58. (new) The apparatus of claim 57 wherein said VCEV further comprises a heater.
59. (new) The apparatus of claim 58 further comprising a blower or compressor for circulating said EGDVGVM.
60. (new) The apparatus of claim 59 further comprising a pump for circulating said ELP.
61. (new) The apparatus of claim 57, further comprising a counterflow heat exchanger for exchanging heat between said ELP and said DAL.
62. (new) The apparatus of claim 57, further comprising a cooler for cooling said DAL.
63. (new) The apparatus of claim 57 further comprising a heater for heating said ELP.